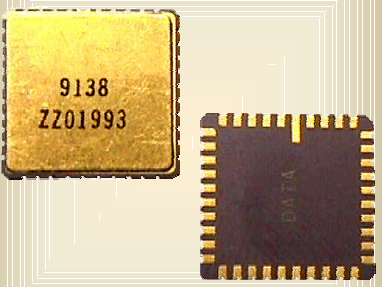
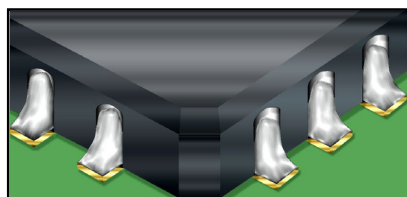


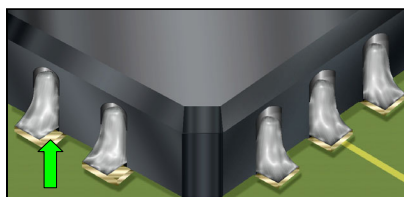
| SURFACE MOUNT TECHNOLOGY (SMT)<br>LEADLESS CHIP CARRIERS "LLCC"                   |   |
|---|---|
|  | <p><u>Leadless Chip Carriers</u></p> <p>Leadless Chip Carriers (LLCC) packages are characterized by external connections consisting of metallized inset terminations (a castellation), making the package resemble a miniature castle.</p> <p>The use of LLCC packages is not recommended for high reliability / spaceflight applications, due to the limited mechanical reliability of the terminations.</p> <p>See Section 7.01 "Surface Mount Soldering, General Requirements", for common accept / reject criteria.</p> |



#### PREFERRED

The part is centered with the castellations centered across the width of the land pattern area and properly oriented. Solder fillets exhibit complete wetting, proper thickness, and positive angle.

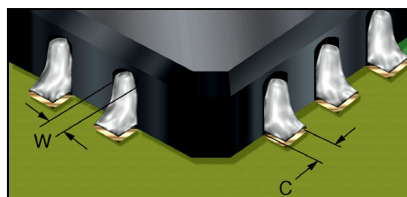
[NASA-STD-8739.2 \[ 12.8.1 \], \[ 12.9.7.a \]](#)



#### ACCEPTABLE

The part is not centered, but the castellations are on the land pattern (there is no side overhang).

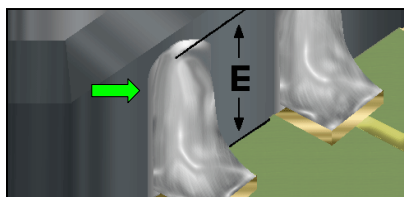
[NASA-STD-8739.2 \[ 12.8.1 \], \[ 12.9.7.a \]](#)



#### ACCEPTABLE END JOINT WIDTH (C)

The width of the solder joint shall be equal to the castellation width (W).

[NASA-STD-8739.2 \[ 12.8.1 \], \[ 12.9.7.a \]](#)



#### ACCEPTABLE MAXIMUM FILLET HEIGHT (E)

The fillet shall extend to the edge of the castellation metallization, and shall have a positive wetting angle.

[NASA-STD-8739.2 \[ 12.8.1 \], \[ 12.9.7.a \]](#)

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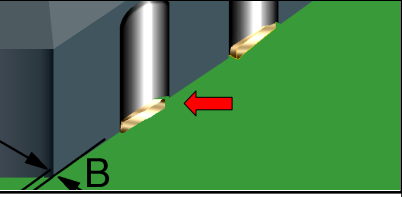
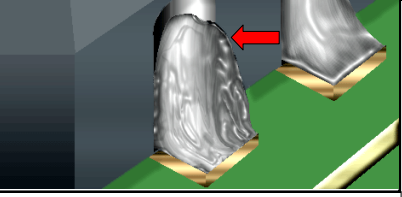
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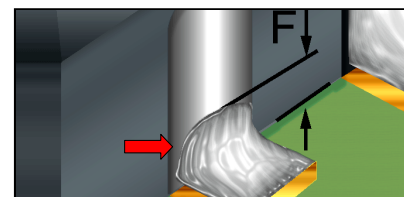
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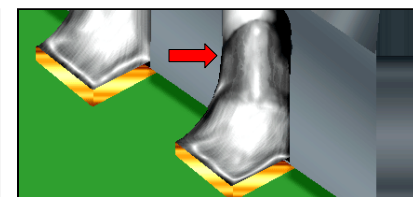
| SURFACE MOUNT TECHNOLOGY (SMT)<br>LEADLESS CHIP CARRIERS "LLCC" (cont.)             |   |
|---|---|
|  | <p><b>UNACCEPTABLE<br/>END OVERHANG (B)</b></p> <p>End overhang of the edge of the chip body (with respect to the pad termination end) is not permitted.</p> <p><a href="#">NASA-STD-8739.2 [ 12.6.2.9 ]</a></p>                                    |
|  | <p><b>UNACCEPTABLE<br/>IMPROPER WETTING</b></p> <p>The solder fillet shall exhibit a positive wetting angle, wet all elements of the connection, and shall extend to the edge of the pad.</p> <p><a href="#">NASA-STD-8739.2 [ 12.9.7.a.1 ]</a></p> |



#### UNACCEPTABLE INSUFFICIENT SOLDER

The minimum fillet height (F) shall not be less than 75% of the castellation thickness.

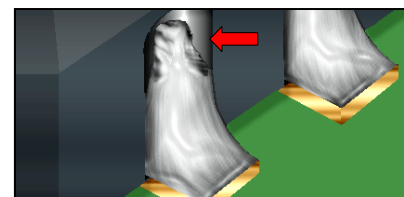
[NASA-STD-8739.2 \[ 12.8.2.b.6 \], \[ 12.9.7.b.2 \]](#)



#### UNACCEPTABLE NONWETTING

The fillet shall not exhibit non-wetting at the top of the solder fillet.

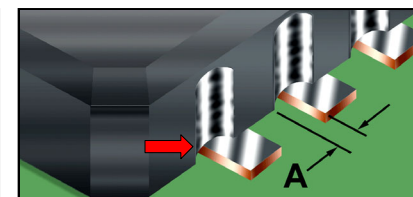
[NASA-STD-8739.2 \[ 12.9.7.b.4 \]](#)



#### UNACCEPTABLE POOR FLOW

The fillet shall not exhibit poor or uneven flow at the top of the solder fillet.

[NASA-STD-8739.2 \[ 12.9.7.b.4 \]](#)



#### UNACCEPTABLE SIDE OVERHANG (A)

The castellation shall not overhang the edge of the land.

[NASA-STD-8739.2 \[ 12.9.7.b.1 \]](#)

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**SURFACE MOUNT TECHNOLOGY (SMT)  
LEADLESS CHIP CARRIERS "LLCC" (cont.)**

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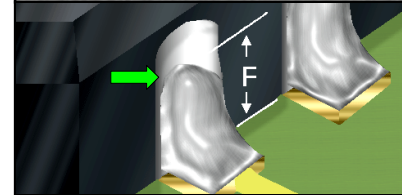
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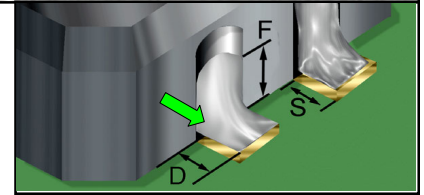
**SURFACE MOUNT TECHNOLOGY (SMT)  
LEADLESS CHIP CARRIERS "LLCC" (cont.)**



**ACCEPTABLE  
MINIMUM FILLET HEIGHT (F)**

The solder fillet shall extend upwards at least 75% of the castellation metallization, and shall have a positive wetting angle.

[NASA-STD-8739.2 \[ 12.9.7.b.2 \]](#)



**ACCEPTABLE  
SIDE JOINT LENGTH (D)**

The length of the side joint (D) shall be 50% of the minimum fillet height (F), or the land length external to the package (S), whichever is less.

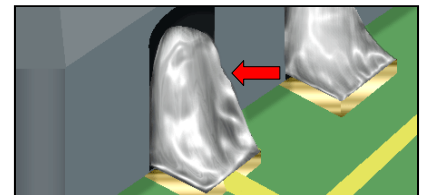
[NASA-STD-8739.2 \[ 12.9.7.a \]](#)



**ACCEPTABLE  
SOLDER FILLET**

The solder fillet may have a bulbous appearance, but shall be well-wetted and exhibit a positive angle at the castellation and pad terminus.

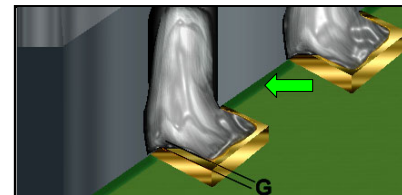
[NASA-STD-8739.2 \[ 12.9.7.a \]](#)



**UNACCEPTABLE  
EXCESS SOLDER**

The solder fillet shall not exhibit a negative wetting angle at the top of the termination and/or at the edge of the land area.

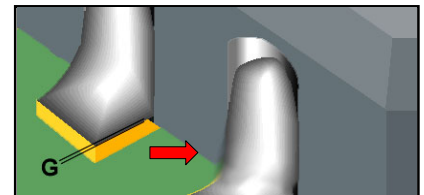
[NASA-STD-8739.2 \[ 12.9.7.b.3 \]](#)



**ACCEPTABLE  
SOLDER THICKNESS (G)**

The solder thickness shall elevate the chip body be at least 0.127 mm (0.005 in.) above the printed wiring board surface, unless satisfactory cleaning can be demonstrated with reduced clearance.

[NASA-STD-8739.2 \[ 12.9.7.a.3 \]](#)



**UNACCEPTABLE  
INADEQUATE SOLDER THICKNESS (G)**

A spacing of less than 0.127 mm (0.005 in.) between the chip body and the printed wiring board surface may prevent removal of flux and solder fines from underneath the chip.

[NASA-STD-8739.2 \[ 12.9.7.a.3 \]](#)

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